

THEORETICAL AND PRACTICAL MODELS FOR ANALYSING A COUNTRY'S ENTREPRENEURIAL ECOSYSTEM AS A MEASURE OF INNOVATION CAPACITY

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Abstract: *The study presented in this article is based on the premise that innovation is the foundation of economic growth in today's economic and social landscape, a necessity that becomes even more evident during times of crisis. The objective is to investigate the connections between innovation and a country's entrepreneurial ecosystem, resulting from the interaction among stakeholders, resources, and institutions. Exploratory research is used to analyse key points in the specialized literature relevant to the topic outlined in the title, as well as descriptive-analytical quantitative research based on secondary sources provided by the Global Entrepreneurship Index (GEI). Within this framework, dimensions and pillars characteristic of Romania are illustrated. Subsequently, following the presentation of comparative analyses using EU countries as examples, directions for improving the Romanian entrepreneurial ecosystem are highlighted by focusing actions on the lines of effort provided by the GEI model.*

Keywords: entrepreneurship, innovation, index, model

1. Introduction: The entrepreneurial ecosystem approach – between conceptual models and necessity

The entrepreneurial ecosystem is defined as "the geographically bounded system of individuals, organizations, physical resources, social structures, and cultural values that generates new entrepreneurial activities" [1]. This concept is a recent one, having been used in scientific research since 2008, a year known as the onset of the global financial crisis. During this period, it is analysed in relation to the concept of information entropy, which influences financial orientations within an entrepreneurial ecosystem [2].

Over time, studies have emerged highlighting the role of universities in entrepreneurship: on the one hand, in the form of academic entrepreneurship

manifested in the commercialization of research and technology [3]; on the other hand, through a focus on graduates and the enhancement of their entrepreneurial development [4]. Research analysing the development of entrepreneurship has demonstrated that the decision to become an entrepreneur is influenced by several elements of the entrepreneurial ecosystem, namely: access to entrepreneurial education and the know-how provided by the university, the positive image of the entrepreneur, and the perception of the administrative burden associated with starting a business [5].

Since experts had already anticipated the multiplier effect of entrepreneurship on economic development as early as 2015, they developed the concept of a collaborative approach by creating

entrepreneurial communities capable of fostering and supporting an entrepreneurial ecosystem, with the aim of increasing entrepreneurs' capacity to develop themselves and their businesses in support of community economic development [6].

The relationship between growth and the entrepreneurial ecosystem is explained in the research on three levels [7]: the individual (company) level, considered the most difficult because entrepreneurs' motivation for firm growth is hindered by various psychological factors; the micro-environmental level, where support from the entrepreneurial ecosystem is active, with minor issues regarding connectivity and financing; the macro-environmental level, which pertains to public policy and cultural attitudes toward firm growth.

Reducing economic dependence on multinational corporations and on the automotive and mechanical sectors, which are in a state of constant flux, provides a compelling case for launching support programs that foster the creation of an entrepreneurial ecosystem capable of nurturing the emergence of entrepreneurs and driving continuous innovation [8].

The most recent studies describe best practices in the field of entrepreneurship, such as the establishment of creative or innovation hubs. These can be established within universities, thereby connecting faculty, students, and the business community [9], or in the form of independent hubs that collaborate with universities, research centres, and companies, acting as institutional intermediaries that help bridge institutional gaps in the entrepreneurial ecosystems of developing countries, such as those in Africa [10].

The skills required of a successful entrepreneur are constantly evolving; thus, researchers have recently demonstrated that adaptability and external support networks (family and communities), alongside innovation, are essential in today's entrepreneurial ecosystem, to the detriment of technical skills [11].

Although the link between innovation and

entrepreneurship is well-established in the literature, this chapter aims to demonstrate a country's innovation potential by analysing the health of its entrepreneurial ecosystem, using data provided by the Global Entrepreneurship and Development Institute (GEDI). Based on information collected by GEDI, researchers have demonstrated that entrepreneurial activities have a constructive and noteworthy impact on economic growth in BRICS countries, and that an entrepreneurial ecosystem in each country is necessary to support new, dynamic, and rapidly growing enterprise [12].

2. Research Methodology

This article presents a quantitative, comparative, descriptive-analytical study based on secondary data provided by Global GEDI [13]. The analysis aims to measure the performance of the Romanian entrepreneurial ecosystem and to assess Romania's position relative to other countries analysed (Germany, Italy, Hungary).

Thus, to assess the state of entrepreneurship in Romania, the GEI (Global Entrepreneurship Index) tool was used, developed by GEDI, an international nonprofit organization dedicated to researching the relationship between entrepreneurship and economic development. The initiative to develop the tool dates back to 2008, and currently covers approximately 137 countries worldwide, providing a comparative overview of entrepreneurial ecosystems.

The GEI is a statistical tool that measures entrepreneurial performance globally by analysing three dimensions: entrepreneurial attitudes, entrepreneurial skills, and entrepreneurial aspirations, which combine behavioural, institutional, and economic factors.

GEDI collects and processes micro-level data from surveys administered to the general public and experts, which it combines with official macro-level statistical data for each country participating

in the project; this information is updated annually. The resulting values are standardized, normalized, and aggregated into GEDI pillars.

Regarding the method of calculating indicators for each dimension, the entrepreneurial attitudes dimension can be used as an example; this represents a composite index calculated by GEDI based

on several pillars, through a process of international standardization and penalization of the weakest link. The values presented in Table 1 represent inputs or intermediate scores, and the final score for the entrepreneurial attitudes dimension is not the result of a simple arithmetic sum. The algorithm for calculating the GEDI score for a dimension is shown in Figure 1.

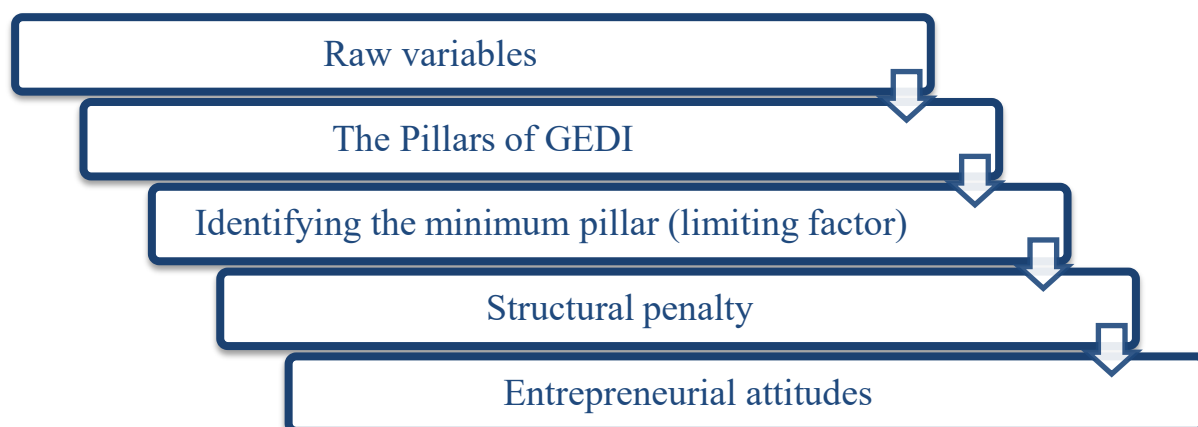


Figure 1: Machining features and their tool access directions

3. An Analysis of Romania's Entrepreneurial Ecosystem in a European Context

The GEDI tool calculates a GEDI score for each country as the average of the indices obtained across the three dimensions. Each dimension consists of its specific pillars, as shown in Table 1, which illustrates the tool's application to Romania.

According to the GEDI methodology, the pillar with the weakest performance acts as a weak link, a bottleneck, limiting the aggregate score. In the case analysed, pillars such as risk-taking and entrepreneurial networks record the lowest relative values,

acting as a limiting factor in the calculation of entrepreneurial attitude, resulting in a score of 29.54, the lowest entrepreneurial dimension score for Romania.

Table 1, which summarizes the GEDI structure by presenting the three sub-indices and their corresponding pillars for Romania, highlights that entrepreneurial performance is conditioned by multiple structural imbalances, not just the level of a single dimension. The values represent normalized GEDI scores for Romania, calculated based on the methodology of the Global Entrepreneurship and Development Institute.

Table 1 Dimensions and Pillars of the Global Entrepreneurship Development Index (GEDI) – Romania [14]

DIMENSIONS	PILLARS	SCORE
Entrepreneurial attitudes	Perception of opportunities	0.30
	Initial entrepreneurial skills	0.38
	Risk-taking	0.24
	Entrepreneurial networks	0.19
	Cultural support for entrepreneurship	0.42
	Entrepreneurial attitudes	29.54

DIMENSIONS	PILLARS	SCORE
Entrepreneurial skills	Start-up opportunities	0.29
	Technology adoption	0.47
	Human capital	0.45
	Competition	0.29
	Entrepreneurial skills	35.67
Entrepreneurial aspirations	Product innovation	0.30
	Process innovation	0.30
	Accelerated growth	0.58
	Internationalization	0.69
	Venture capital	0.73
	Entrepreneurial aspirations	45.96
	GEI Romania	37.06

The score of 37.06 in Table 1 - calculated by the GEDI tool, with a maximum possible score of 100 - indicates that Romania has moderate entrepreneurial openness, although potential does exist, as confirmed by the venture capital pillar, i.e., funds accessible to entrepreneurs. The score indicates that without corrective action on the other pillars, even in the event of increased funding, entrepreneurial development in Romania will remain modest.

To identify the adjustments that can be made to mitigate the limiting effect of the weak pillars, the GEI tool calculates a series of values (between 0 and 1) that indicate by how much the pillar scores would need to increase to remove the bottleneck in the ecosystem. Table 2 highlights where efforts (policies, resources) should be concentrated to improve Romania's GEI score. For the pillars that can be improved, targeted interventions and areas of focus have been identified to increase the overall score.

Table 2 Ways to improve the Romanian entrepreneurial ecosystem by increasing efforts in the GEI pillars

Pillars	Growth needed in pillar	Percentage of total new effort	Where should we focus our efforts?
Perception of opportunities	0.04	9%	- entrepreneurial education focused on identifying opportunities; - access to information on funding opportunities.
Initial entrepreneurial skills	0.00	0%	-
Risk acceptance	0.10	22%	- mechanisms for entrepreneurial recovery after failure; - stability of tax legislation; - normalization of failure within entrepreneurial culture; - risk sharing; - risk-oriented education.
Entrepreneurial networks	0.15	33%	- development of entrepreneurial hubs; - mentoring programs;

Pillars	Growth needed in pillar	Percentage of total new effort	Where should we focus our efforts?
			- public–private networks; - joining international entrepreneurship networks.
Cultural support for entrepreneurship	0.00	0%	-
Start-up opportunities	0.05	11%	- ensuring transparency of opportunities; - increasing exploitation potential (connections, courage); - thematic incubators.
Technology adoption	0.00	0%	-
Human capital	0.00	0%	-
Competition	0.05	11%	- focus on value-added niches; - support for product innovation; - internationalization.
Product innovation	0.04	9%	- support for market validation; - promotion on the international market.
Process innovation	0.03	7%	- adoption of new techniques and practices; - process digitization; - technology transfer.
Accelerated growth	0.00	0%	-
Internationalization	0.00	0%	-
Venture capital	0.00	0%	-

As we can see in Table 2, the pillar causing a critical bottleneck in the Romanian entrepreneurial ecosystem is related to the creation of entrepreneurial networks, which means that Romanian entrepreneurs are very poorly connected to one another and to investors and potential mentors. The second pillar, which, although not critical, nevertheless places a constraint on Romania's entrepreneurial ecosystem, is risk acceptance, which scores low, indicating a fear of failure, a lack of initiative, and limited growth ambitions. The pillars related to opportunity—both in terms

of perception and initial entrepreneurial skills—are functional pillars, but they are not sufficiently leveraged to support robust entrepreneurial dynamics. The pillars related to competition and innovation in products and processes are also functional, but better exploitation is needed, such as targeting competitive and uncrowded markets, improving product marketing, and continuing the implementation of digital technologies. The pillars listed in Table 2 with a growth need of 0 do not represent a bottleneck for the entrepreneurial ecosystem in its current configuration.



Figure 2: A Comparison of Entrepreneurial Performance in Hungary, Italy, Romania, and Germany

In the comparative analysis of entrepreneurial dimensions and GEI scores, three other European Union countries were selected alongside Romania: Germany as a benchmark economy, Italy—a second developed economy with specific characteristics—and Hungary, an economy comparable to Romania's. Figure 2 shows

that Italy, although a developed economy, has a fairly rigid entrepreneurial ecosystem based on traditionalism, which is reflected in its GEI score. Romania, through its openness to financing and the acceleration of digitalization, has compensated for its limited cultural support.

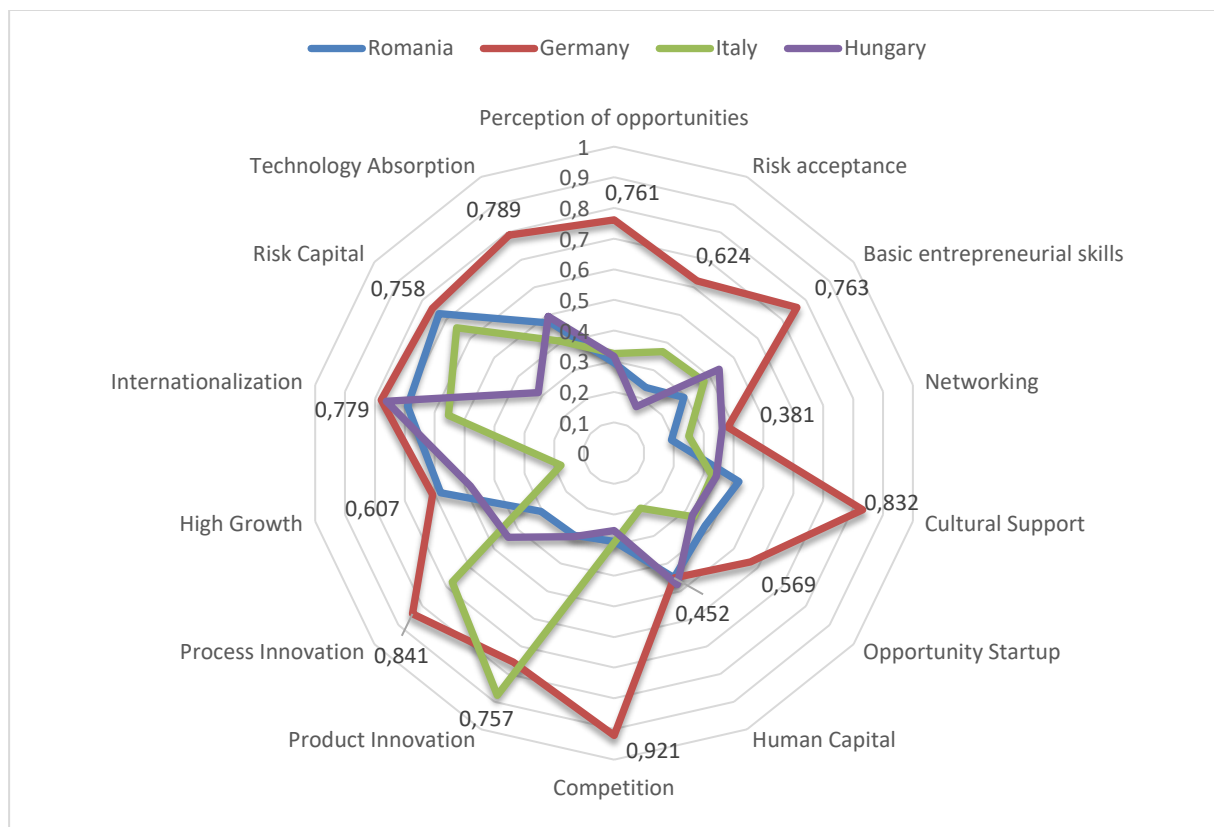


Figure 3: Comparison of Romania, Germany, Italy, and Hungary regarding the entrepreneurial dimensions that make up the GEI pillars

The numbers in Figure 3 represent the highest scores (for example, Italy's score for Product Innovation is 0.757, and Germany's score for Competition is 0.921). The

comparison in Figure 3 highlights significant differences not only in the aggregate GEDI scores but especially in the internal structure of the entrepreneurial ecosystems. Germany

stands out for a relatively balanced distribution of pillars, indicating a mature ecosystem, while Romania and Hungary exhibit structural imbalances, with certain dimensions acting as limiting factors. A common obstacle to the development of entrepreneurship is the formation of entrepreneurial networks, with even Germany feeling the effects of this bottleneck. Furthermore, human capital is a critical dimension that remains underdeveloped and underutilized. Italy occupies an intermediate position, characterized by a combination of entrepreneurial tradition and institutional constraints.

Romania ranks lower than Germany and Italy and is relatively close to Hungary, indicating existing entrepreneurial potential that is, however, insufficiently harnessed in terms of attitudes. The relatively high venture capital factor reflects both domestic and foreign financing opportunities for entrepreneurial initiatives. Existing financing opportunities encourage innovative entrepreneurship, offering the potential to mitigate the effects of less developed dimensions and contribute to building a culture of entrepreneurship in Romania.

4. Conclusions

Using the GEDI methodology, Romania achieved a GEDI score of 37.06, which is below the average for developed economies but close to that of other emerging economies in the EU. The score reflects strong digital skills, access to external financing, and access to international entrepreneurial models. Of the 14 pillars analysed, seven constitute barriers to the development of entrepreneurship in Romania, becoming priorities for focusing efforts and public policies to improve the GEI score.

Analysing the country's innovation capacity based on a score of 37.06, it can be concluded that Romania possesses the basic elements for innovation, but there are

significant constraints that limit its innovative potential. Consequently, innovation exists and can be supported, but to reach the level of advanced economies, it is necessary to strengthen the entrepreneurial infrastructure, facilitate access to financing, and stimulate innovative initiatives.

The results of the case study, the values of the analysed pillars, and the recommendations regarding how to change them to improve the Romanian entrepreneurial ecosystem can also be interpreted in relation to cultural traits. A low score for the risk-taking pillar confirms that we are a country that falls within the high uncertainty avoidance dimension - a country with a historical experience of instability. The bottleneck regarding entrepreneurial networks highlights the individualism present in Romanian society and the lack of trust in public institutions. Thus, entrepreneurial performance is not merely a matter of resources, but also of norms, values, and social relationships.

The comparative analysis of Romania, Germany, Italy, and Hungary, based on the dimensions that make up the three pillars of the GEI, aimed to help us form an opinion regarding our country's standing in terms of entrepreneurship development and to identify the obstacles that stand in the way of innovation through entrepreneurship. Although there has been talk of an entrepreneurial culture in Romania since the time when the first European funding for entrepreneurship development became available (in the 2014–2020 financial period), the concept has not been understood or applied with a view to ensuring sustainability. All initiatives remained at the idea stage because there is still a lack of solid entrepreneurial education, functional clusters are insufficient, and public policies geared toward entrepreneurs are underdeveloped; as a result, a negative perception of the business environment prevails.

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